Amendments to the Specification

Please replace paragraph [0017] on page 6 with the following amended paragraph:

[0017] This invention provides methods and apparatus for training fuzzy logic inference systems to produce outputs which indicate a characteristic of a test system in response to receiving a plurality of parameter values. The invention is described below ~~using as an example of such a system a battery testing system~~ using a battery testing system as an example. In this case the characteristic may be a state of health of a test battery and the parameter values may be the values of parameters such as voltages, currents, and times measured during the application of a current waveform to a test battery.

Please replace the brief description of drawings spanning pages 7-9 with the following amended brief description of drawings:

Brief Description of Drawings

[0023] In drawings which illustrate non-limiting embodiments of the invention:

Figure 1 is a block diagram of an apparatus according to a preferred embodiment of the invention;

Figure 2 is a plot of current as a function of time for a possible current waveform for use in the invention;

Figure 3 is a flowchart illustrating a fuzzy logic method for determining the state-of-health of a battery under test;

Figure 4 is a flowchart illustrating a fuzzy logic method for ~~to~~ computing the state-of-health of a battery under test in accordance with its model type;

Figure 5A is a graphical representation of an example fuzzy logic membership function;

Figure 5B is a graphical representation of a set of three exemplary fuzzy logic membership functions for use in fuzzification of a resistance parameter;

Figure 6 is a flowchart illustrating a method for efficiently fuzzifying parameter values;

Figure 7 is a graphical representation of a set of three exemplary fuzzy logic membership functions for use in defuzzification;

Figure 8 is a flowchart illustrating a training method that uses a calibration battery to create and optimize a model-specific matrix for use with a new model of battery;

Figure 9 is a flowchart illustrating a portion of the training method of Figure 8 in more detail;

Figure 10 is a flow chart illustrating operation of the optimization portion of the training method of Figure 8;

Figures 11A and 11B are flow charts illustrating an optimization routine for one parameter;

Figure 12A is a graphical illustration of the processes of translating a fuzzy set;

Figure 12B is a graphical illustration of the processes of flexing a fuzzy set;

Figures 13A and 13B illustrate specific flex and translation operations that may occur in optimizing fuzzy sets for a parameter;

Figure 14 is a process for translating a fuzzy set for use in the invention; and,

Figure 15 is a process for flexing a fuzzy set for use in the invention.

Please replace paragraph [0072] on page 27 with the following amended paragraph:

[0072] The reliably-measured state-of-health (SoH_{RM}) is then recorded in block 807. In an alternative embodiment of the invention where the user accurately knows the SoH of the calibration battery by some other means, computation of the

SoH for the calibration battery may be foregone and the known SoH may be simply recorded at block 807 as input from the user. After recording the reliably-measured ~~SoH_{RM}~~ SoH_{RM}, the calibration battery is partially discharged (block 808) so that the battery is operating in a state that is neither fully charged nor discharged. The battery is preferably allowed to rest, for example for ½ hour before continuing.

Please replace paragraph [0074] on page 28 with the following amended paragraph:

[0074] If block 814 determines that the computed SoH and reliably-measured SoH_{RM} values do not ~~match~~ match, then block 816, which is described below, adjusts the prototype matrix in a way that attempts to minimize the difference between the reliably-measured SoH_{RM} recorded in block 807 and the SoH computed in block 810. Different membership functions are adjusted depending upon the SoH_{RM} of the calibration battery. As indicated by block ~~818~~ 818, the preceding parts of method 800 may be repeated, preferably using calibration batteries that have different states-of-health. The modified prototype matrix is saved as a model-specific matrix in block 820.

Please replace paragraph [0078] spanning pages 29 and 30 with the following amended paragraph:

[0078] In block 904 a ratio z is obtained. The ratio z is used in scaling the points which define the membership functions. The ratio z may be calculated using the following equation:

$$z = \begin{cases} 1, & SoH_{RM} \le 59 \\ \dfrac{B - SoH_{RM}}{B - A}, & 59 < SoH_{RM} \le 100 \\ 1, & 100 < SoH_{RM} \end{cases} \qquad (4)$$

where **A** and *B* are the scaling parameters obtained from columns 3 and ~~4~~ 4, ~~respectively~~ respectively, of Table IV and SoH_{RM} is the reliably-measured SoH_{RM} recorded in block 807. In block 906, the ratio *z* obtained in block 904 is used to obtain a scaling factor for one or more membership functions of the prototype matrix.

Please replace Table VII on page 33, with the following amended Table VII:

Table VII - Membership Functions for Parameter *P* After Scaling			
Function	*l*	*m*	*r*
P-Excellent	23	46	69
P-Good	~~48~~ 58	81	104
P-Poor	81	104	-

Please replace paragraph [0085] spanning pages 33 and 34 with the following amended paragraph:

[0085] If the current calibration battery is not the first calibration battery (i.e. step 908 detects a non-zero value in the epoch counter) then only one of the points which defines the membership functions which correspond to each parameter may need to be changed. This is because the points which define the membership functions have already been scaled. Which one of the plurality (~~nine~~ eight in the example

being described here) of points which define the three membership functions associated with each parameter is scaled depends upon the calibration category to which the current test battery has been assigned. The point to be scaled is the same point identified in Table V. A new value for the point is obtained as a weighted average of its current value and the parameter value for the current calibration battery. The new value for the point obtained in block **914** may be calculated using the following equation:

$$x_{new} = \frac{c \times x_{old} + [(1-z)x_{old} + zy]}{c+1} \qquad (7)$$

where x_{new} is the new value for the point, x_{old} is the existing value for the point, z is the ratio of equation (4); y is the parameter value measured for the calibration battery; and c is the value of the calibration counter of Table IIIa for the calibration category q of the current test battery (as determined in block 902).